NOTICE

All drawings located at the end of the document.

REF 03-RF-01174, JLB-076-03

NO FURTHER ACCELERATED ACTION JUSTIFICATION FOR THE EAST TRENCHES

PAC REFERENCE NUMBER: NE-111.2, NE-111.3, and NE-111.5 – NE-111.8

IHSS Reference Number NE-111 2, NE-111 3, NE-111 5, NE-111 6, NE-111 7, and NE-111 8

Unit Name Trenches T-5, T-6, and T-8 through T-11 (Trench T-3 through T-13 are collectively known as the East Trenches, however in this document, the six trenches for which a No Further Accelerated Action justification is presented, are collectively referred to as the East Trenches)

Approximate Location N750,000, E2,087,500

Date(s) of Operation or Occurrence

The trenches were used during the period from July 29, 1954, through August 14, 1968, although the exact dates of operation are unknown (Dow 1970a) To date, no documentation has been found that records the timeframe during which any particular trench was receiving waste Similarly, none of the HRR interviewees were knowledgeable on dates of operation of individual trenches Trenches T-9, T-10, and T-11 were differentiated from the other trenches and added to the disposal trench inventory in 1977 (Rockwell 1985)

Description of Operation or Occurrence

Trenches T-2 (900-109) and the East Trenches (T-3 - T-13) were used primarily for the disposal of sanitary wastewater treatment plant sludge (Dow 1970a) The sludge removed from the wastewater treatment plant was placed on sludge drying beds The dried material removed from the sludge drying beds was placed in the disposal trenches The sludge disposed of in these trenches should consist primarily of concentrated organic matter typically present in sanitary wastewater treatment plant sludge The total amount of sludge disposed in Trenches T-2 through T-13 is estimated at 125,000 kilograms (Rockwell 1983) As many as 300 flattened drums may have also been disposed in any of Trenches T-2 through T-11 following burning of contaminated oils that had been held in the drums (Dow 1970b) The burning of the contaminated oils had been done in Oil Burn Pit No-2 (PAC 900-153) from March 1957 to mid-1965 (Dow 1970b), not in the trenches (Dow 1973a) The trenches are variable in length, with the average length being approximately 250 feet (Dow 1971) The trenches are reported to be approximately 10 feet deep and are provided with two feet of soil cover

Some amounts of additional materials were also disposed in Trenches T-4, T-9, and T-11 These other materials consisted of asphalt planking (approximately 130,000 square feet of asphalt planking) in T-4 and T-11 from the re-design of Solar Pond 207A (PAC 000-101) in 1963, and scrap metal and junk in T-9 (Rockwell 1983) An employee was contacted who remembers that Trench T-13 may contain some laboratory waste

At the same time that Trenches T-9, T-10, and T-11 were identified (1977), it appears that the numbering system for the trenches was slightly modified Whereas earlier documents had presented a consistent numbering system, in a 1983 document a trench that had previously been referred to as Trench T-4 became T-11 (Rockwell, 1983) This 1983 document placed the T-4

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DOCUMENT CLASSIFICATION REVIEW WAIVER PER CLASSIFICATION OFFICE
CEX-105-01

ADMIN RECORD

BZ-A-000614

Trench essentially as an addition to Trench T-3 (Dow 1970a and Rockwell 1983) This same 1983 document designated Trench T-9 as essentially an extension of Trench T-7 (Rockwell 1983), but in earlier documents this trench had been referred to as Trench T-5 (Dow 1970a) Trench T-10 had not been identified or named prior to 1983 The trench identified as Trench T-5 in the 1983 document was a trench not previously identified (comparison of maps in references Dow, 1970a and 5)

Trenches T-12 and T-13 were identified and incorporated into the Remedial Investigation for Operable Unit 2 in June of 1993 when a plant employee completed further research of aerial photographs in the East Trenches area Trench T-13 was visible only in vertical aerial photographs taken on April 15, 1966, and April 29, 1967, and is now covered by the East Access Road (north bypass) 900 feet east of the inner east guard gate Trench T-12 was identified as an extension of a previously identified trench (T-11) It also lies primarily beneath the East Access Road

Physical/Chemical Description of Constituents Released

Some uranium and plutonium contamination is present in the sludge disposed in the trenches It is reported that the older sludge would have had primarily uranium contamination with newer sludge having an increasing amount of plutonium contamination (Dow 1970a) Total long-lived alpha activity present in the sludge was reported between a minimum of 382 pCi/g in August 1964 to a maximum of 3,591 pCi/g in June 1960 (Dow 1970a) It was estimated in a 1973 document that Trench T-4 (currently designated Trench T-11 as discussed above) contains 16 2 grams of uranium-235 (Dow 1973b) Uranium contamination may also be present in flattened drums that may have been disposed in any of Trenches T-2 through T-11

On at least one occasion it is believed that 2,400 gallons of water and lathe coolant generated in Building 444 was also disposed in one of the East Trenches This waste had an average activity of 150,000 dpm/l It is believed that this is total alpha activity The activity of this material was reported as 1 35 x 10^8 dpm with approximately 1 3 kilograms (kg) of depleted uranium present in the waste (Dow 1964) It is unknown whether or not this material was in drums

Responses to Operation or Occurrence

Soil samples were collected from the three new trenches identified in 1977 (Trenches T-9, T-10, and T-11) during the 1977 to 1983 time frame Soil from Trench T-9 was found to vary from 0 40 to 68 pCi/g in plutonium activity, and from 2 4 to 450 pCi/g uranium activity Trench T-10 was found to contain from 0 18 to 14 pCi/g plutonium activity and from 40 to 126 pCi/g uranium activity Trench T-11 was found to contain 4 5 to 50 pCi/g plutonium activity and 0 9 to 158 pCi/g in uranium activity (Rockwell 1983)

In the late 1980s and early 1990s, Phase I and Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigations/Remedial Investigations (RFI/RIs) were conducted in the East Trenches area (a part of Operable Unit 2 at the time) The results are provided in the OU 2 Phase II RFI/RI Report (EG&G 1995a) These investigations did not provide the data necessary to determine dimensions and boundaries of the trenches, or areas of high concentration of contaminants in the trenches For example, while at least one borehole was drilled into each trench, drilling through the trenches was excluded because of the uncertainties in the trench contents, and in whether the area beneath the trenches was contaminated Drilling through the

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trenches could potentially have created pathways for contaminants to migrate downward into uncontaminated areas

In 1995 and 1996, further investigations of the East Trenches area were conducted in accordance with the Trenches and Mound Site Characterization Work Plan (EG&G 1995) The results of the investigation are provided in the Draft Trenches and Mound Site Characterization Report (RMRS 1996) This investigative program utilized several methodologies to meet project objectives historical data were compiled to identify potential contaminants, trench location and size, aerial photographs were examined to identify disturbed areas, verify trench dimension and determine times of operation, a visual survey was conducted to identify features on the ground and to lay out a geophysical sampling grid, two electromagnetic surveys were conducted to delineate magnetic anomalies and to delineate trench boundaries, Ground Penetrating Radar (GPR) surveys were conducted to better determine trench depth and extent, soil gas surveys were conducted to identify and delineate volatile organic contaminant plumes, and subsurface soil sampling was conducted to verify soil gas survey results and to better define metal and radionuclide contamination present at the sites

Figure 1 shows the locations of the East Trenches based on the results of the Trenches and Mound Site Characterization Note that the trench boundaries are different from the IHSS/PAC boundaries because the electromagnetic and GPR surveys better defined the trench boundaries (and depths)

Fate of Constituents Released to Environment

The following conclusions were drawn from the Trenches and Mound Site Characterization with respect to the East Trenches (T-5, T-6, and T-8 through T-11) 1) there were no contaminant concentrations in subsurface soil above any RFCA Subsurface Soil Action Levels (those established in RFCA 1996), 2) there were no contaminant plumes in groundwater originating from the trenches and the area at Trenches T-5 through T-9 is often dry, and 3) with no pathway to surface water and without a well defined source, it is recommended that the trenches not be remediated

Despite the conclusions drawn form the Trenches and Mound Site Characterization, the East Trenches have been assessed to render a No Further Accelerated Action (NFAA) determination The assessment is pursuant to recent modifications to RFCA Attachment 5 that were approved June 5, 2003, specifically, the introduction of new Action Levels (ALs) and the integrated risk-based approach (application of the Subsurface Soil Risk Screen) Trench T-3 and T-4 are not included in this analysis because they were previously remediated, and Trench T-7, T-12 and T-13 are not included because they have already been proposed for NFAA

The East Trenches were extensively sampled as part of the Trenches and Mound Site Characterization and through groundwater monitoring that has been conducted in the area over the past 15 years Table 1 summarizes the boreholes that penetrated or were directly adjacent to the East Trenches The borehole locations are depicted on Figures 2 through 7 Data for samples from these borehole have been used in the analysis provided herein The data are summarized in Tables 2 through 7 These tables show analytes that were detected above background (see discussion below) The suites of analyses performed on the samples from each trench are identified in the table notes In these tables, the following decision rules were applied to the calculation of summary statistics

1 Data rejected during validation was eliminated from the data set before computing statistics
2 The minimum value represents the lowest value observed for the analyte regardless of whether it was detected or not detected (non-detected results have an attached U qualifier which signifies that the analyte was not detected at the concentration shown)
3 The maximum value is the highest detected value observed
4 The average was computed using replacement values for the data that were non-detects (U-qualified data) The replacement value is one half the value reported with the attached U qualification)

Figures 2 through 7 show all the data that were detected above background at least once, and have a Wildlife Refuge Worker Soil Action Level (AL) RFCA ALs (Wildlife Refuge Worker and Ecological Receptor) are from RFCA Attachment 5, dated June 5, 2003 Background levels for inorganic constituents for subsurface soil are from the Background Geochemical Characterization Report (DOE 1993) All background values used for comparison are the mean background value plus two standard deviations Any detection of an organic compound is considered an above background level observation

SURFACE SOIL ASSESSMENT

Surface soil in the area of the East Trenches contains above background levels of plutonium and americium resulting from the historical release and wind dispersal of these radionuclides from the 903 Pad The need for, and extent of, any surface soil remediation in this area will be addressed in the 903 Lip Area and Americium Zone Interim Measure/Interim Remedial Action

APPLICATION OF THE SUBSURFACE SOIL RISK SCREEN

Screen 1 – Are Contaminant of Concern (COC) Concentrations Below Table 3 Wildlife Refuge Worker (WRW) Soil Action Levels?

No Two samples from Trench T-8 contained plutonium-239,240 at concentrations exceeding the AL of 50 pCi/g (Table 4 and Figure 4) The samples are the 3 to 8 foot interval and 8 to 10 foot interval for borehole 12795 The maximum plutonium-239,240 concentration was 642 pCi/g The americum-241 concentration in the 3 to 8 foot interval (105 pCi/g) also exceeded the AL of 76 pCi/g No other samples from this trench or from any other trench had analyte concentrations that excced the Wildlife Refuge Worker ALs

Screen 2 – Is there potential for subsurface soil to become surface soil?

No The East Trenches are not in an area prone to landslides as shown in the attached Figure 8[1]

Screen 3 – Does subsurface soil radiological contamination exceed criteria in Section 5.3 and Attachment 14?

No ALF Section 5 3(C)(2) requires the removal of soil in the 3-6 foot depth interval that contains plutonium at concentrations that exceed 3 nCi/g with an areal extent of contamination that exceeds 80m^2 As shown on Figure 4, plutonium concentrations did not exceed 3 nCi/g in any of the Trench T-8 waste samples Concentrations of plutonium (and americium) are significantly lower than the 3nCi/g limit Also, concentrations of plutonium and americium did

[1] Ref Figure 1 of RFCA Attachment 5

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not exceed the Wildlife Refuge Worker ALs in any other samples in this trench or any other trench considered in this evaluation

Screen 4 – Is there an environmental pathway and sufficient quantity of COC that would cause exceedance of surface water standards (SWS)?

No Contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated by the East Trenches However erosion is an insignificant pathway because the East Trenches are in a flat-lying area not prone to erosion, and the waste material is covered with 2 feet of soil

With respect to the groundwater pathway, Trenches T-5 through T-9 are located near to a hydraulic divide where water may migrate to the northeast or to the southeast depending on groundwater levels (Figure 9) Most of the time, the wells in the vicinity of Trenches T-5 through T-9 are dry When there was sufficient groundwater in the area for sampling, concentrations of volatile organic compounds (VOCs) have been very low, and on the average, are not at concentrations that exceed the Safe Drinking Water Act Maximum Contaminant Levels (MCLs)

Groundwater is usually present at Trenches T-10 and T-11, and the groundwater flow is to the northeast There is considerable VOC contamination in the groundwater some or most of which appears to have originated from other sources to the southwest of the trenches Because VOCs are largely absent in the waste material in Trenches T-10 and T-11, it does not appear the trenches are a source for groundwater contamination Regardless, any contaminants released to groundwater at these trenches would be captured by the East Trenches Plume Groundwater Collection and Treatment System This zero-valence iron treatment system is effective in the removal of VOCs

Screen 5 – Are COC concentrations above Table 3 Action Levels for ecological receptors?

Yes Of all the samples that were collected from the East Trenches, only two had an analyte concentration that exceeded the ecological receptor ALs One sample was the 3 to 6 foot interval from borehole 12495 at Trench T-9 (see Table 5 and Figure 5), and the other sample was the 3 to 5 foot interval from borehole 10295 at Trench T-10 (see Table 6 and Figure 6) In both cases the analyte exceeding the ecological receptor AL was lead, and the concentrations of lead were just above the AL The lead AL of 25 6 mg/kg is based on protection of the American Kestrel Because the American Kestrel, a bird of prey would not be directly exposed to the buried material, Preliminary Remediation Goals (PRGs) for other ecological receptors were examined[2] The PRGs for protection of the prairie dog and Preble's Meadow Jumping Mouse (PMJM) are 149 mg/kg and 642 mg/kg, respectively Because the low concentrations of lead relative to these PRGs, it is concluded for the NFAA that there is no threat posed to ecological receptors by the East Trenches[3]

[2] The AL is the lowest PRG above Site background levels that was calculated for each of the five selected wildlife receptors judged to be representative of species at RFETS Preble's meadow jumping mouse and black tailed prairie dog (fossorial [burrowing] small mammals), mourning dove (small ground-feeding bird), terrestrial invertebrate (multiple species), and American kestrel (avian predator)

[3] At this time, ecological ALs are not available for all receptors/chemical combinations, however, draft ALs are available for a small subset of chemicals Screen 5 currently evaluates only this subset Risk to ecological receptors will be readdressed through the ecological risk assessment portion of the Comprehensive Risk Assessment (CRA)

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Stewardship Analysis

Application of the Soil Risk Screen to the East Trenches indicates No Further Accelerated Action (NFAA) is necessary for protection of public health and environment However, because subsurface soil at a few of these PACs has contaminant concentrations that exceed Wildlife Refuge Worker or Ecological Receptor soil ALs, both near-term and long-term stewardship actions have been recommended[4] They are discussed below

Near-Term Management Recommendations

Near-term recommendations for environmental stewardship include the following

- Excavation at the sites will continue to be controlled through the Site Soil Disturbance Permit process, and
- Site access and security controls will remain in place pending implementation of long-term controls

Long-Term Stewardship Recommendations

Based on remaining environmental conditions at the East Trenches, no specific long-term stewardship activities are recommended beyond the generally applicable Site requirements that may be imposed on this area in the future, which are dependent upon the final remedy selected Institutional controls that will be used as appropriate for this area include the following

- Prohibitions on construction of buildings,
- Restrictions on excavation or other soil disturbance, and
- Prohibitions on groundwater pumping in the area of the East Trenches

These specific long-term stewardship recommendations will also be summarized in the Rocky Flats *Long Term Stewardship Strategy* No engineered controls, environmental monitoring, or physical controls (e g , fences) are recommended as a result of the conditions remaining at the East Trenches

The East Trenches will be evaluated as part of the Sitewide Comprehensive Risk Assessment, which is part of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) and Corrective Measures Study/Feasibility Study (CMS/FS) that will be conducted for the Site The need for and extent of any, more general, long-term stewardship activities will also be analyzed in RFI/RI and CMS/FS and will be proposed as part of the preferred alternative in the Proposed Plan for the Site Institutional controls and other long-term stewardship requirements for Rocky Flats will ultimately be contained in the Corrective Action Decision/Record of Decision, in any post-closure Colorado Hazardous Waste Act permit that may be required, and in any post-RFCA agreement

NFAA Summary

The East Trenches, specifically trenches T-5, T-6, and T-8 through T-11, are proposed for NFAA The Subsurface Soil Risk Screen and ALs in RFCA Attachment 5 dated 6/5/03 have been applied to these PACs The risk screen shows no potential adverse risk to a wildlife refuge

[4] The area of trenches T-5, T-6, and T-8 through T-11 is contiguous with the other trenches (T-3, T-4, T-7, T12, and T-13), some of which contain subsurface soil contaminant concentrations that exceed Wildlife Refuge Worker soil ALs Therefore, there would be no reduction in the area requiring near-term and long-term stewardship actions if the subsurface soil in any of trenches T-5, T-6, and T-8 through T-11 were removed

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worker or ecological receptor Plutonium is present in the buried waste at a maximum concentration of 642 pCi/g, which is well below the 3 nCi/g limit that triggers further evaluation and potential soil removal There is little potential for contaminated runoff because the sites are located in a relatively flat area and the waste is buried The VOC concentrations in the East Trenches waste material is very low, and accordingly, the trenches do not appear to be sources for groundwater contamination The dry conditions at Trench T-5 through T-9 will substantially limit any contaminant migration via groundwater At trenches T-10 and T-11, contaminants in groundwater, most if not all of which appear to originate from other sources, are migrating to the north and will be captured by the East Trenches Passive Reactive Barrier system Only two samples from all of the trenches had a contaminant concentration (lead) exceeding an ecological receptor AL However, the AL for lead was established for protection of the American Kestrel, which would not be exposed to the buried material Comparison of the lead concentrations to other ecological-based PRGs for burrowing animals shows that the concentrations of lead in the trench are of no ecological concern Therefore, no further accelerated action is required for the East Trenches

References

DOE 1993a, *Background Geochemical Characterization Report,* Golden, CO, September

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Dow, 1970a *A Summary of On Site Radioactive Waste Disposal*, E A Putzier, Dow Chemical Company, April 22, 1970

Dow, 1970b *Summary of Contaminated Waste Storage Burial at the Rocky Flats Plant Site*, transmitted to Myron C Waddell (Colorado Health Planning Council) by Martin B Biles, Director of Division of Operational Safety, December 22, 1970

Dow, 1971 Aerial Photo dated August 6, 1971 Dow Chemical Company

Dow, 1973a Response to F Gillies Questions, Notes by J F Willging, Dow Chemical Company

Dow, 1973b Monthly Status Report – Health Physics Operations, Technical and Construction - November, 1973, E A Putzier, Dow Chemical Company

EG&G, 1995 *Trenches and Mound Site Characterization Work Plan*

Rockwell, 1983 *Environmental Inventory, Updated Information on Burial Sites at Rocky Flats*, EA-321-83-240, C T Illsley, Rockwell International, January 28,1983

Rockwell, 1985 Attachment 1 - *Rocky Flats Plant Past Disposal Site*, RFP Revised Part A Permit Application, Rockwell International

RMRS, 1996 *Draft Trenches and Mound Site Characterization Report*, September 1996

Table 1-.Subsurface Soil Sampling Locations for the East Trenches

IHSS/PAC Number	Borehole
T-5 (NE-111 2)	11495, 11595
T-6 (NE-111 3)	11695 11795
T-8 (NE-111 5)	12795, 12895, 08491
T-9 (NE-111 6)	12295, 12395, 12495
T-10 (NE-111 7)	10195 10295, 10395 10495
T-11 (NE-111 8)	11095 11195, 10491, 07891

Table 2 Summary of Contaminant Concentrations at Trench T-5

Analyte	Total number of samples	Number of samples exceeding BG[1]	Number of samples exceeding AL	Minimum Conc	Maximum Conc	Average Conc	AL	BG
Organics (ug/kg)								
1,1,1-Trichloroethane	5	1	0	5U	29	76 4	79700000	
2-Methylnaphthalene	4	1	0	340U	26000	7217 5	20400000	
Acenaphthene	4	1	0	340U	2000	1217 5	40800000	
Acetone	5	2	0	40	86	1346 2	102000000	
Anthracene	4	1	0	340U	1600	1117 5	204000000	
Benzene	5	1	0	2U	2	73 2	205000	
Benzo(a)anthracene	4	2	0	330	600	725	34900	
Benzo(a)pyrene	4	2	0	330	1100	565	3490	
Benzo(b)fluoranthene	4	2	0	340U	1400	932 5	34900	
bis(2-Ethylhexyl)phthalate	4	1	0	340U	460	832 5	1970000	
Butylbenzylphthalate		1	0	35	35	1133 75	147000000	
Chrysene	4	3	0	340U	1100	657 5	3490000	
Ethylbenzene	5	1	0	5U	62	85 2	4250000	
Fluoranthene	4	2	0	340U	1100	987 5	27200000	
Fluorene	4	1	0	340U	3200	1517 5	40800000	
Methylene chloride	5	5	0	5	330	76 2	2530000	
Naphthalene	4	1	0	340U	5900	2192 5	3090000	
n-Nitrosodiphenylamine	4	1	0	340U	2400	1317 5	7810000	
Phenol	4	3	0	710	1700	1012 5	613000000	
Pyrene	4	3	0	340U	3500	1702 5	22100000	
Tetrachloroethene	5	4	0	5U	710	265 3	615000	
Toluene	5	3	0	5U	26	80 3	31300000	
Trichloroethene	5	3	0	4	1600	517 9	19600	
Xylene	5	2	0	5U	370	148 1	1000000000	
Inorganics (mg/kg)								
Cadmium	4	2	0	49U	20 8	8 18	962	1 7
Radionuclides (pCi/g)								
Americium-241	4	2	0	0 00464	2 092	0 967	76	0 02
Plutonium-239/240	4	2	0	0 01264	14 12	6 33	50	0 02

Note Analytes shown are those that were detected at least once above background levels and have a Wildlife Refuge Worker Action Level No analytes exceeded the Ecological Action Levels Subsurface soil samples were analyzed for TargetAnalyte List (TAL) metals, gross alpha and beta, uranium-233 234, uranium-235 uranium-238, americium-241, plutonium-239,240, and Target Compound List Volatile Organic Compounds and Semi Volatile Organic Compounds

BG - Background

AL – Wildlife Refuge Worker Action Level

U – The analyte was undetected at the concentration shown

[1] Organic detections estimated or otherwise are considered to be above background concentrations

Above AL

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Table 3 Summary of Contaminant Concentrations at Trench T-6

Analyte	Total number of samples	Number of samples exceeding BG[1]	Number of samples exceeding AL	Minimum Conc	Maximum Conc.	Average Conc	AL	BG
Organics (ug/kg)								
2-Chlorophenol	6	1	0	46	46	162	5110000	
Acetone	8	4	0	8	15	14 7	102000000	
bis(2-Ethylhexyl)phthalate	6	5	0	46	130	98 8	1970000	
Butylbenzylphthalate	6	1	0	43	43	162	147000000	
Ethylbenzene	8	1	0	4	4	2 88	4250000	
Methylene chloride	8	4	0	5	6	4 19	2530000	
Phenol	6	4	0	140	490	298	613000000	
Tetrachloroethene	8	1	0	2	2	2 56	615000	
Toluene	8	4	0	5U	56	20 9	31300000	
Xylene	8	4	0	2	14	4 25	1000000000	
Radionuclides (pCi/g)								
Americium-241	6	2	0	0 003243	0 042	0 016	76	0 02
Plutonium-239/240	6	4	0	0 001692	0 39	0 152	50	0 02
Uranium-234	6	1	0	0 4373	6 93	1 72	300	2 64
Uranium-235	6	1	0	0 02364	0 2324	0 068	8	0 12

Note Analytes shown are those that were detected at least once above background levels and have a Wildlife Refuge Worker Action Level No analytes exceeded the Ecological Action Levels Subsurface soil samples were analyzed for Target Analyte List (TAL) metals gross alpha and beta, uranium-233,234, uranium-235 uranium-238, americium-241 plutonium-239 240, and Target Compound List Volatile Organic Compounds, Semi-Volatile Organic Compounds, and Pesticides

BG - Background

AL – Wildlife Refuge Worker Action Level

U - The analyte was undetected at the conentration shown

[1] Organic detections, estimated or otherwise, are considered to be above background concentrations

Above AL

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Table 4 Summary of Contaminant Concentrations at Trench T-8

Analyte	Total number of samples	Number of samples exceeding BG[1]	Number of samples exceeding AL	Minimum Conc	Maximum Conc.	Average Conc	AL	BG
Organics (ug/kg)								
1,1,2,2-Tetrachloroethane	9	1	0	5U	6	3 17	100000	
Acetone	9	6	0	5	31	19 2	102000000	
Benzo(b)fluoranthene	8	1	0	86	86	178	34900	
Benzoic Acid	8	1	0	270	270	846	1000000000	
bis(2-Ethylhexyl)phthalate	8	2	0	45	59	157	1970000	
Chrysene	8	1	0	100	100	180	3490000	
Fluoranthene	8	1	0	160	160	188	27200000	
Methylene chloride	9	4	0	1	9	3 44	2530000	
Phenol	8	4	0	260	1300	437	613000000	
Pyrene	8	1	0	160	160	188	22100000	
Toluene	9	2	0	2	3	3 61	31300000	
Inorganics (mg/kg)								
Antimony	8	1	0	5 5U	91.3	15 6	409	16 97
Cadmium	8	2	0	33U	2 9	1 02	962	1 7
Copper	8	8	0	4 8	157	32 3	40900	38 21
Iron	8	8	0	5210	152000	27300	307000	41046 52
Molybdenum	8	5	0	1U	1970	248	5110	25 61
Nickel	8	8	0	21 9	450	90 2	20400	62 21
Silver	8	4	0	86U	25 9	6 56	5110	24 54
Radionuclides (pCi/g)								
Americium-241	8	4	1	-0.002	104.9	13.7	76	0 02
Plutonium-239/240	8	6	2	0 001	642.4	96.8	50	0,02
Uranium-234	8	8	0	0 54	9 379	2 79	300	2 64
Uranium-235	8	7	0	0 019	0 3749	0 106	8	0 12

Note Analytes shown are those that were detected at least once above background levels and have a Wildlife Refuge Worker Action Level No analytes exceeded the Ecological Action Levels Subsurface soil samples were analyzed for Target Analyte List (TAL) metals, gross alpha and beta, uranium-233,234, uranium-235, uranium-238, americium-241, plutonium-239 240 and Target Compound List Volatile Organic Compounds, Semi-Volatile Organic Compounds and Pesticides

BG - Background

AL – Wildlife Refuge Worker Action Level

U - The analyte was undetected at the conentration shown

[1] Organic detections, estimated or otherwise, are considered to be above background concentrations

Above AL

Table 5 Summary of Contaminant Concentrations at Trench T-9

Analyte	Total number of samples	Number of samples exceeding BG[1]	Number of samples exceeding AL	Minimum Conc	Maximum Conc.	Average Conc	AL	BG
Organics (ug/kg)								
1,1,1-Trichloroethane	6	2		2	300	52 3	79700000	
Acenaphthene	4	1		160	160	179	40800000	
Acetone	6	3		16	1100	216	102000000	
Anthracene	4	1		190	190	186	204000000	
bis(2-Ethylhexyl)phthalate	4	2		370U	71000	18100	1970000	
Butylbenzylphthalate	4	2		140	4900	1351	147000000	
Chloroform	6	1		2	2	64	19200	
Chrysene	4	2		40	370	196	3490000	
Fluoranthene	4	1		430	430	246	27200000	
Fluorene	4	1		120	120	169	40800000	
Methylene chloride	6	1		3	3	64 2	2530000	
Naphthalene	4	1		110	110	166	3090000	
Phenol	6	6		360	1300	617	613000000	
Pyrene	4	2		90	1200	416	22100000	
Tetrachloroethene	6	2		50	16000	2677	615000	
Trichloroethene	6	2		130	190	55 3	19600	
Inorganics (mg/kg)								
Cadmium	6	1		52U	2 4	0 63	962	1 7
Copper	6	6		6 1	79 7	22 8	40900	38 21
Lead[2]	6	6	1	2 5	39 5	11 5	1000	24 97
Silver	6	4		89U	219	38 6	5110	24 54
Zinc	6	6		10 9	143	41 9	307000	139 1
Radionuclides (pCi/g)								
Americium-241	6	6		0 00177	0 02185	0 0104	76	0 02
Plutonium-239/240	6	6		0 003176	0 09982	0 0448	50	0 02
Uranium-234	6	6		0 455	9 615	2 27	300	2 64
Uranium-235	6	6		0 01257	0 3418	0 087	8	0 12
Uranium-238	6	6		0 4671	10.26	2 44	351	1 49

Note Analytes shown are those that were detected at least once above background levels and have a Wildlife Refuge Worker Action Level Subsurface soil samples were analyzed for Target Analyte List (TAL) metals, gross alpha and beta, uranium-233 234, uranium-235, uranium-238, americium-241, plutonium-239,240, and Target Compound List Volatile Organic Compounds and Semi-Volatile Organic Compounds

BG - Background

AL – Wildlife Refuge Worker Action Level

U - The analyte was undetected at the conentration shown

[1] Organic detections, estimated or otherwise are considered to be above background concentrations

[2] The sample from the 3 to 6 foot interval in borehole 12495 had a concentration of 39 5 mg/kg which exceeded the ecological Action Level of 25 6 mg/kg

Above AL

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Table 6 Summary of Contaminant Concentrations at Trench T-10

Analyte	Total number of samples	Number of samples exceeding BG[1]	Number of samples exceeding AL	Minimum Conc	Maximum Conc.	Average Conc	AL	BG
Organics (ug/kg)								
1,1,1-Trichloroethane	9	1		5U	7	3 06	79700000	
Acetone	9	9		8	48	19 9	102000000	
Benzo(a)anthracene	10	2		340U	1800	576	34900	
Benzo(a)pyrene	10	3		340U	11000	2366	3490	
Benzo(b)fluoranthene	10	1		340U	2800	936	34900	
Benzoic Acid	10	4		88	300	3755	1000000000	
bis(2-Ethylhexyl)phthalate	10	5		35	120	773	1970000	
Butylbenzylphthalate	10	5		47	3000	1164	147000000	
Carbon Tetrachloride	9	1		5U	19	4 39	81500	
Chloroform	9	1		5U	5	2 83	19200	
Chrysene	10	3		340U	3400	1016	3490000	
Diethylphthalate	10	1		56	56	816	590000000	
Di-n-butylphthalate	10	4		41	83	781	73700000	
Fluoranthene	10	1		340U	450	701	27200000	
Indeno(1,2,3-cd)pyrene	10	1		340U	1100	766	34900	
Methylene chloride	9	6		2	41	8 11	2530000	
n-Nitrosodiphenylamine	10	1		340U	870	743	7810000	
Phenol	10	6		350U	2000	1236	613000000	
Tetrachloroethene	9	2		4	410	48	615000	
Toluene	9	3		2	10	3 22	31300000	
Trichloroethene	9	2		4	11	3 61	19600	
Inorganics (mg/kg)								
Arsenic	8	8		3 4	15 9	6,46	22 2	13 14
Lead[2]	8	8		1 9	28.2	8.41	1000	24.97
Radionuclides (pCi/g)								
Americium-241	8	8		0 002585	7 67	0 966	76	0 02
Plutonium-239/240	8	8		-0 0135	34 79	4 38	50	0 02
Uranium-238	8	8		0 502	2 668	0 985	351	1 49

Note Analytes shown are those that were detected at least once above background levels and have a Wildlife Refuge Worker Action Level Subsurface soil samples were analyzed for Target Analyte List (TAL) metals gross alpha and beta, uranium-233 234, uranium-235, uranium-238 americium-241, plutonium-239 240, and Target Compound List Volatile Organic Compounds Semi-Volatile Organic Compounds, and PCBs

BG - Background

AL – Wildlife Refuge Worker Action Level

U - The analyte was undetected at the conentration shown

[1] Organic detections estimated or otherwise are considered to be above background concentrations

[2] The sample from the 3 to 5 foot interval in borehole 10295 had a concentration of 28 2 mg/kg which exceeded the ecological Action Level of 25 6 mg/kg

Above AL

Table 7 Summary of Contaminant Concentrations at Trench T-11

Analyte	Total number of samples	Number of samples exceeding BG[1]	Number of samples exceeding AL	Minimum Conc.	Maximum Conc.	Average Conc	AL	BG
Organics (ug/kg)								
Acetone	19	4	0	9	28	10 6	102000000	
Benzoic Acid	13	2	0	62	230	757	1000000000	
bis(2-Ethylhexyl)phthalate	13	5	0	47	110	142	1970000	
Butylbenzylphthalate	13	4	0	59	140	157	147000000	
Carbon Tetrachloride	19	1	0	3	3	2 66	81500	
Chloroform	19	1	0	2	2	2 61	19200	
Diethylphthalate	13	1	0	160	160	178	590000000	
Di-n-butylphthalate	13	1	0	56	56	171	73700000	
Methylene chloride	19	2	0	2	6	2 84	2530000	
Phenol	13	3	0	270	550	236	613000000	
Tetrachloroethene	19	2	0	4	4	2 79	61>000	
Toluene	19	5	0	2	610	36 4	31300000	
Inorganics (mg/kg)								
Nickel	15	15	0	7 6	163	33 5	20400	62 21
Radionuclides (pCi/g)								
Americium-241	15	15	0	0 002	0 04939	0 015	76	0 02
Plutonium-239/240	15	15	0	0	0 2632	0 062	50	0 02

Note Analytes shown are those that were detected at least once above background levels and have a Wildlife Refuge Worker Action Level No analytes exceeded the Ecological Action Levels Subsurface soil samples were analyzed for Target Analyte List (TAL) metals gross alpha and beta, uranium-233 234, uranium-235, uranium-238 americium-241 plutonium-239,240, and Target Compound List Volatile Organic Compounds, Semi-Volatile Organic Compounds and Pesticides

BG - Background

AL - Wildlife Refuge Worker Action Level

U - The analyte was undetected at the conentration shown

[1] Organic detections, estimated or otherwise are considered to be above background concentrations

Above AL

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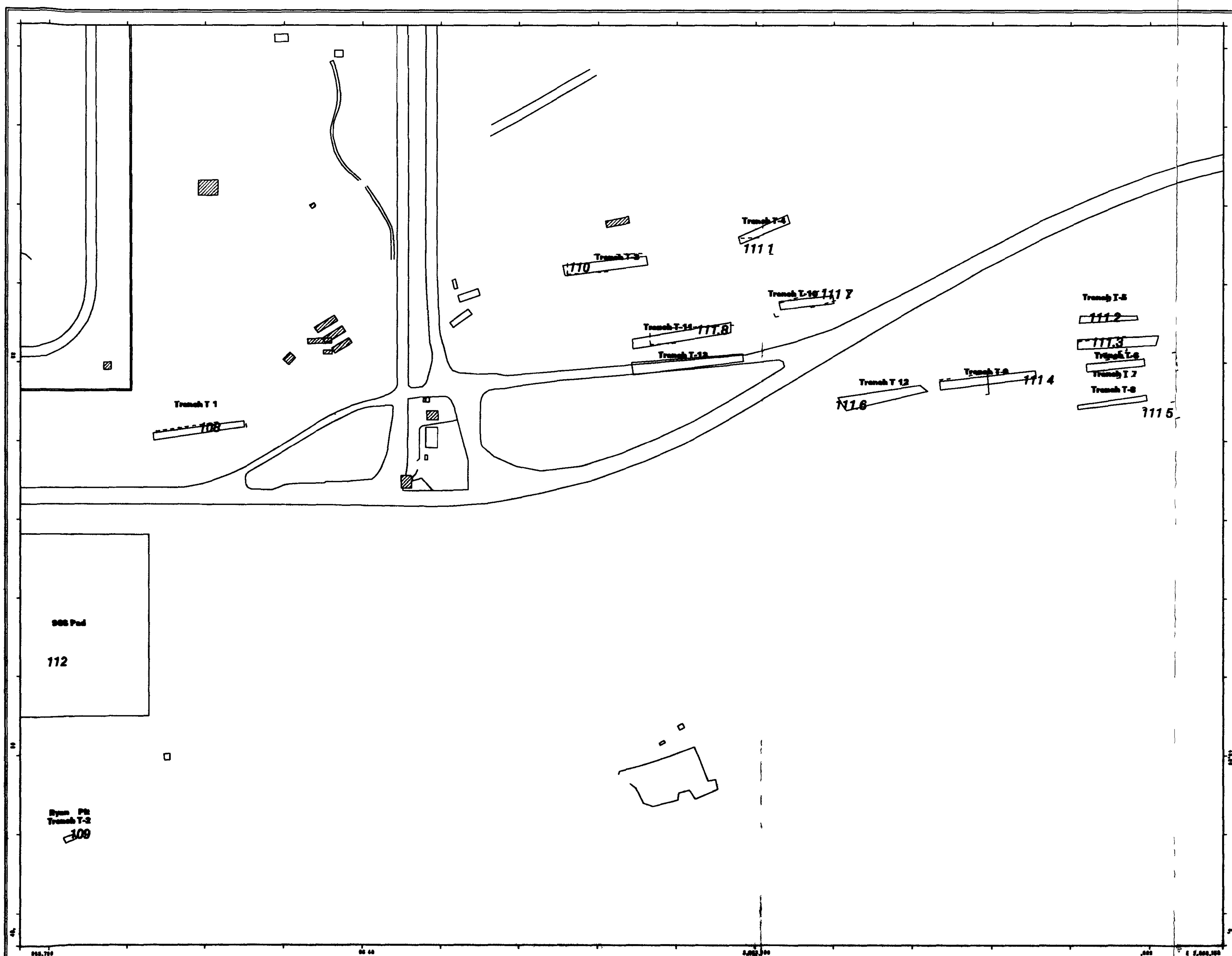

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Figure 1

East Trenches Location Map

EXPLANATION

Trench Boundary

IHSS Boundary

Standard Map Features

Buildings and other structures

Demolished buildings and Other Structures

Paved roads

DATA SOURCE BASE FEATURES: Buildings, fences, hydrographic roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95

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Scale 1 2290
1 inch represents approximately 191 feet

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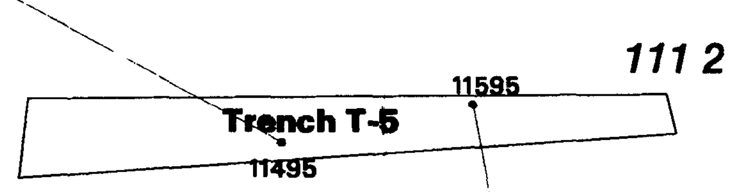
Methylene hloride	3		3 0	ug/kg	5	2530000	39500	
T hloroethene		8	980	ug/kg	5	9600	509000	
Methylene hloride	3	8	35	ug/kg	5	2530000	39500	
Trichloroethene	3	8	1600	ug/kg	5	19600	509000	
Tetrachloroethene	3	8	570	ug/kg	5	615000	37500	
Methylene chloride	8	10	5	ug/kg	5	2530000	39500	
Tetrachloroethene	3	8	710	ug/kg	5	615000	37500	
Acetone	3	8	86	ug/kg	100	02000000	211000	
1,1,1 Trichloroethane	3	8	29	ug/kg	5	79700000		
T luene	3	8	26	ug/kg	5	31300000	128000	
Xylene	3	8	20	ug/kg	5	1000000000		
Phenol	8	10	710	ug/kg	330	613000000		
Chrysene	3	8	1000	ug/kg	330	3490000		
Benzo(b)fluoranthene	3	8	1400	ug/kg	330	34900	1010000	
Benzo( )pyrene	3	8	1100	ug/kg	330	3490	25700	
Pyrene	3	8	3500	ug/kg	330	22100000		
Phenol	3	8	1700	ug/kg	330	613000000		
Benzo( )anthracene	3	8	600	ug/kg	330	34900	800000	
bis(2-Ethylhexyl)phthalate	3	8	460	ug/kg	330	1970000		
Fluoranthene	3	8	1100	ug/kg	330	27200000		
Butylbenzylphthalate	8	10	35	ug/kg	330	147000000		
Cadmium	3	8	11.4	mg/kg	1	962		1 7
Chromium VI	3	8	18.3	mg/kg	2	268		
Chromium VI	8	10	16.3	mg/kg	2	268		
Plutonium-239/240	3	8	11 18	pCi/g	0 0294	50	3800	0 02
Americium-241	3	8	1 765	pCi/g	0 0578	76	1900	0 02



Methylene chl oride	3	6	6	ug/kg	5	2530000	39500	
Tetrachloroethene	3	6	38	ug/kg	5	615000	37500	
Trichloroethene	8	10	4	ug/kg	5	19600	509000	
Benzene	8	10	2	ug/kg	5	205000		
Tetrachloroethene	8	10	6	ug/kg	5	615000	37500	
Toluene	8	10	21	ug/kg	5	31300000	128000	
Ethylbenzene	8	10	62	ug/kg	5	4250000		
Toluene	3	6	7	ug/kg	5	31300000	128000	
Methylene chl oride	8	10	5	ug/kg	5	2530000	39500	
Acetone	8	10	40	ug/kg	100	102000000	211000	
Xylene	8	10	370	ug/kg	5	1E+09		
Chrysene	8	10	1100	ug/kg	330	3490000		
Pyrene	8	10	2400	ug/kg	330	22100000		
Fluorene	8	10	3200	ug/kg	330	40800000		
2-Methylnaphthalene	8	10	26000	ug/kg	330	20400000		
Benzo(b)fl uoran thene	3	6	360	ug/kg	330	34900	1010000	
Benzo( )anthracene	3	6	330	ug/kg	330	34900	800000	
Chrysene	3	6	360	ug/kg	330	3490000		
Benzo(a)pyrene	3	6	330	ug/kg	330	3490	25700	
Fluoranthene	3	6	880	ug/kg	330	27200000		
Pyrene	3	6	740	ug/kg	330	22100000		
Benzo(a)pyrene	8	10	660	ug/kg	330	3490	25700	
n-Nitrosodiphenylamine	8	10	2400	ug/kg	330	7810000		
Anthracene	8	10	1600	ug/kg	330	204000000		
Acenaphthene	8	10	2000	ug/kg	330	40800000		
Naphthalene	8	10	5900	ug/kg	330	3090000		
Phenol	8	10	740	ug/kg	330	613000000		
Plutonium-239/240	3	6	14.12	pCi/g	0 00306	50	3800	0.02
Americium-241	3	6	2.092	pCi/g	0.00712	76	1900	0 02
Cadmium	3	6	20.8	mg/kg	1	962		1 7
Chromium VI	3	6	39	mg/kg	2	268		
Chromium VI	8	10	19.6	mg/kg	2	268		

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Figure 2
Trench T 5
Analyte Detections Above Background Levels

EXPLANATION

- • Boreholes
- /\/ Trench Boundary
- IHSS Boundary

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other tructures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/96

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1 nch repr sents approximately 33 feet

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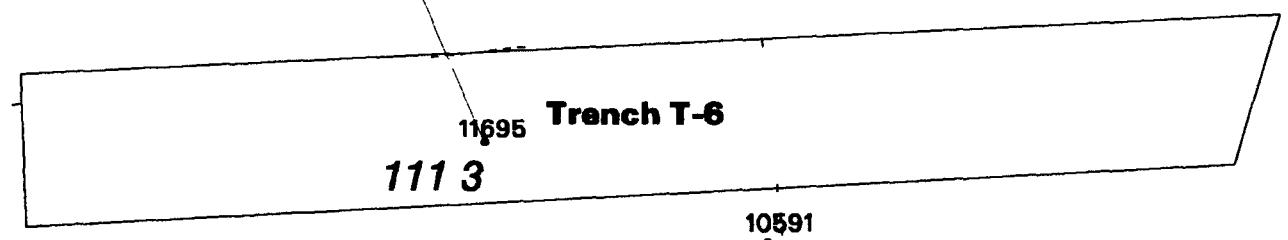
Analyte	Sample Depth	End Depth	Result	Radiological Unit	Detection Limit	Wildlife Refuge Worker	Ecological Receptor Action Level	Mean Plus 2 SD
2-Chlorophenol	8	10	46	ug/kg	330	5110000		
Acetone	3	6	15	ug/kg	100	102000000	211000	
bis(2-Ethylhexyl)phthalate	3	6	130	ug/kg	330	1970000		
bis(2 Ethylhexyl)phthalate	8	10	46	ug/kg	330	1970000		
Methylene chloride	3	6	6	ug/kg	5	2530000	39500	
Methylene Horide	8	10	5	ug/kg	5	2530000	39500	
Phenol	3	6	340	ug/kg	330	613000000		
Phenol	8	10	490	ug/kg	330	613000000		
Uranium-234	8	10	6.93	pCi/g	0 0059	300	1800	2.64
Plutonium-239/240	8	10	0 1034	pCi/g	0 0123	50	3800	0 02
Americium-241	3	6	0 03299	pCi/g	0 00652	76	1900	0 02
Uranium-235	8	10	0 2324	pCi/g	0 0123	8	1900	0 12
Plutonium-239/240	3	6	0 2482	pCi/g	0.00346	50	3800	0 02



Acetone	10 6	10 8	14	ug/kg	10	102000000	211000	
bis(2-Ethylhexyl)phthalate	8	14	66	ug/kg	330	1970000		
Ethylbenzene	10 6	10 8	4	ug/kg	5	4250000		
Tetrachloroethene	15 8	16	2	ug/kg	5	615000	37500	
Toluene	6	6.2	6	ug/kg	5	31300000	128000	
Toluene	17 6	17 8	56	ug/kg	5	31300000	128000	
Toluene	10 6	10 8	46	ug/kg	5	31300000	128000	
Toluene	15 8	16	49	ug/kg	5	31300000	128000	
Xylene	6	6.2	2	ug/kg	5	1000000000		
Xylene	10 6	10 8	14	ug/kg	5	1000000000		
Xylene	15 8	16	5	ug/kg	5	1000000000		
Xylene	17 6	17.8	3	ug/kg	5	1000000000		
Plutonium-239/240	14	18	0 16	pCi/g	0.012	50	3800	0 02
Americium-241	8	14	0.042	pCi/g	0 002	76	1900	0.02
Plutonium-239/240	8	14	0.39	pCi/g	0 002	50	3800	0 02

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Figure 3
Trench T-6
Analyte Detections Above Background Levels

EXPLANATION

- Boreholes
- Trench Boundary
- IHSS Boundary

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other tructures from 1994 aerial fly-over data aptured by EG&G RSI, Las Vegas. Digitized from the orthophotographs. 1/95

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1 inch pr sent approximately 24 feet

0 0 20 40ft

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Figure 4
Trench T-8
Analyte Detections Above Background Levels

EXPLANATION

- • Boreholes
- /\/ Trench Boundary
- IHSS Boundary

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95

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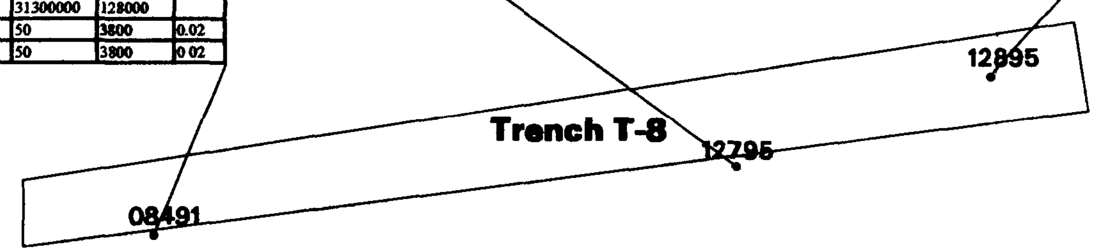
Analyte	Start Depth	End Depth	Result	Result Unit	Detection Limit	W'ldlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
1,1,2,2-Tetrachloroethane	18 7	18 9	6	ug/kg	5	100000		
Acetone	2 5	2 7	31	ug/kg	10	102000000	211000	
Acetone	18 7	18 9	5	ug/kg	10	102000000	211000	
Acetone	6 9	7 1	20	ug/kg	10	102000000	211000	
Methylene chloride	2 5	2 7	4	ug/kg	5	2530000	39500	
Methylene chloride	6 9	7 1	9	ug/kg	5	2530000	39500	-
Toluene	14.4	14 6	3	ug/kg	5	31300000	128000	
Toluene	2 5	2.7	2	ug/kg	5	31300000	128000	
Plutonium-239/240	2	8	0 084	pCi/g	0 002	50	3800	0.02
Plutonium-239/240	8	14	0 24	pCi/g	0 009	50	3800	0 02

Analyte	Start Depth	End Depth	Result	Result Unit	Detection Lims	W'ldlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
Acetone	8	10	15	ug/kg	100	102000000	211000	
Acetone	3	8	24	ug/kg	100	102000000	211000	
Benzo(b)fluoranthene	3	8	86	ug/kg	330	34900	1010000	
Benzoic Acid	3	8	270	ug/kg	1600	1000000000	-	
bis(2 Ethylhexyl)phthalate	8	0	45	ug/kg	330	1970000	-	
Chrysene	3	8	100	ug/kg	330	3490000	-	
Fluoranthene	3	8	160	ug/kg	330	27200000	-	
Methylene chloride	8	10	2	ug/kg	5	2530000	39500	
Phenol	8	10	1300	ug/kg	330	613000000	-	
Phenol	3	8	780	g/kg	330	613000000	-	
Pyrene	3	8	160	ug/kg	330	22100000	-	
Copper	3	8	157	mg/kg	5	40900	-	38 21
Cadmium	3	8	2 9	mg/kg	1	962	-	1 7
Cadmium	8	10	2 9	mg/kg	1	962	-	1 7
Antimony	3	8	91 3	mg/kg	12	409	-	16 97
Silver	8	10	25 9	mg/kg	2	5110	-	24.54
Nickel	3	8	147	mg/kg	8	20400	-	62.21
Molybdenum	3	8	1970	mg/kg	40	5110	-	25 61
Iron	3	8	152000	mg/kg	20	307000	-	41046 52
Uranium-235	8	10	0 1581	pCi/g	0 0182	8	1900	0 12
Uranium-235	3	8	0.3749	pCi/g	0 00714	8	1900	0 12
Americium-241	8	10	4 557	pCi/g	0 192	76	1900	0 02
Americium-241	3	8	104 9	pCi/g	0 812	76	1900	0.02
Uranium-234	8	10	3 93	pCi/g	0 0221	300	1800	2 64
Uranium-234	3	8	9.379	pCi/g	0 0149	300	1800	2 64
Plutonium-239/240	3	8	642 4	pCi/g	0 561	50	3800	0 02
Plutonium-239/240	8	10	131 4	pCi/g	0 156	50	3800	0 02

Analyte	Start Depth	End Depth	Result	Result Unit	Detection Limit	W'kdhfe Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
Acetone	3	8	9	ug/kg	100	102000000	211000	
bis(2 Ethylhexyl)phthalate	8	10	59	ug/kg	330	1970000		
Methylene chloride	3	8	1	ug/kg	5	2530000	39500	
Phenol	8	10	400	ug/kg	330	613000000		
Phenol	3	8	260	ug/kg	330	613000000		
Plutonium-239/240	3	8	0 07271	pCi/g	0 0131	50	3800	0 02
Uranium-234	8	10	3 493	pCi/g	0 0163	300	1800	2 64
Uranium-234	3	8	2 795	pCi/g	0 0246	300	1800	2.64
Nickel	8	10	450	mg/kg	8	20400		62 21



111 5

Scale 1 280
1 inch represents approximately 24 feet

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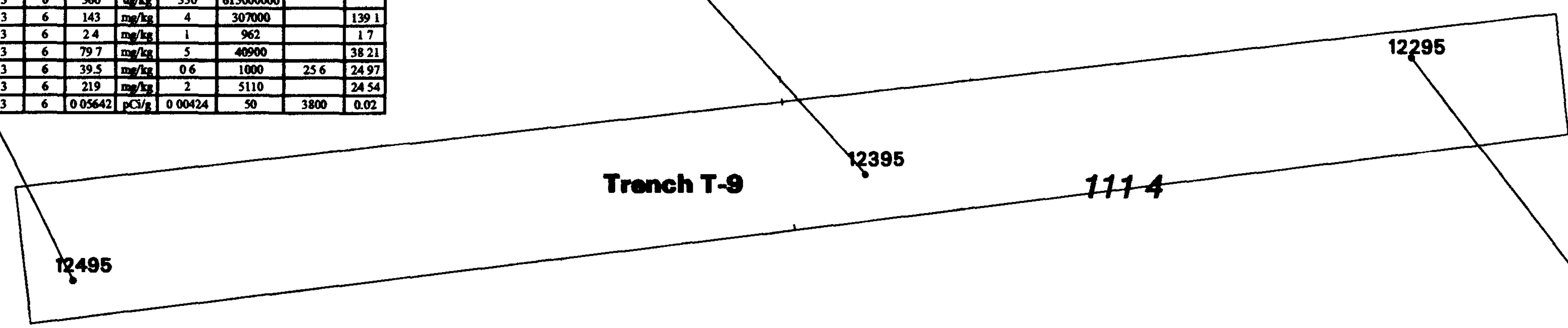
Figure 5
Trench T-9
Analyte Detections Above Background Levels

Analyte	End Depth	Depth Unit	Result	Result Unit	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
1,1,1 Trichloroethane	8	FT	300	ug/kg	5	79700000		
Acetone	8	FT	1100	ug/kg	100	102000000	211000	
Butylbenzylphthalate	8	FT	4900	ug/kg	330	147000000	-	
Phenol	10	FT	700	ug/kg	330	613000000	-	
Phenol	8	FT	410	ug/kg	330	613000000	-	
Tetrachloroethene	8	FT	16000	ug/kg	5	615000	37500	
Trichloroethene	8	FT	190	ug/kg	5	19600	509000	
Plutonium-239/240	10	FT	0 09982	pCi/g	0 00954	50	3800	0 02
Americium-241	10	FT	0 02185	pCi/g	0 00845	76	1900	0 02

Analyte	Start Depth	End Depth	Result	Result Unit	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
Butylbenzylphthalate	8	10	140	ug/kg	330	147000000		
Phenol	8	10	470	ug/kg	330	613000000		
Phenol	3	6	360	ug/kg	330	613000000		
Zinc	3	6	143	mg/kg	4	307000		139 1
Cadmium	3	6	2 4	mg/kg	1	962		1 7
Copper	3	6	79 7	mg/kg	5	40900		38 21
Lead	3	6	39.5	mg/kg	0 6	1000	25 6	24 97
S lver	3	6	219	mg/kg	2	5110		24 54
Plutonium-239/240	3	6	0 05642	pCi/g	0 00424	50	3800	0.02



Analyte	Start Depth	End Depth	Result	Result Unit	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
1,1,1 Trichloroethane	8	10	2	ug/kg	5	79700000	-	
Acenaphthene	3	8	160	ug/kg	330	40800000		-
Acetone	3	8	18	ug/kg	100	102000000	211000	
Acetone	8	10	16	ug/kg	100	102000000	211000	
Anthracene	3	8	190	ug/kg	330	204000000	-	
bis(2 Ethylhexyl)phthalate	8	10	1100	ug/kg	330	1970000	-	
bis(2-Ethylhexyl)phthalate	3	8	71000	ug/kg	330	1970000		
Chloroform	8	10	2	ug/kg	5	19200	101000	
Chrysene	8	10	40	ug/kg	330	3490000	-	
Chrysene	3	8	370	ug/kg	330	3490000		
Fluoranthene	3	8	430	ug/kg	330	27200000		
Fluorene	3	8	120	ug/kg	330	40800000		
Methylene chloride	8	10	3	ug/kg	5	2530000	39500	
Naphthalene	3	8	110	ug/kg	330	3090000	-	
Phenol	3	8	460	ug/kg	330	613000000	-	-
Phenol	8	10	1300	ug/kg	330	613000000		-
Pyrene	8	10	90	ug/kg	330	22100000	-	
Pyrene	3	8	1200	ug/kg	330	22100000	-	
Tetrachloroethene	8	10	50	ug/kg	5	615000	37500	
Trichloroethene	8	10	130	ug/kg	5	19600	509000	
Uranium-235	3	8	0 3418	pCi/g	0.0111	8	1900	0 12
Uranium-234	3	8	9 615	pCi/g	0.0053	300	1800	2 64
Plutonium-239/240	3	8	0 08562	pCi/g	0.00362	50	3800	0 02
Uranium-238	3	8	10.36	pCi/g	0.0124	351	1600	1 49

EXPLANATION

- • Boreholes
- Trench Boundary
- IHSS Boundary

DATA SOURCE BASE FEATURES: Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95

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Scale = 1 : 220
1 inch represents approximately 18 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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Figure 6
Trench T-10
Analyte Detections Above Background Levels

EXPLANATION

- Boreholes
- Trench Boundary
- IHSS Boundary

DATA SOURCE BASE FEATURES: Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95

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Scale = 1 200
1 inch represents approximat ly 17 feet

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Datum NAD27

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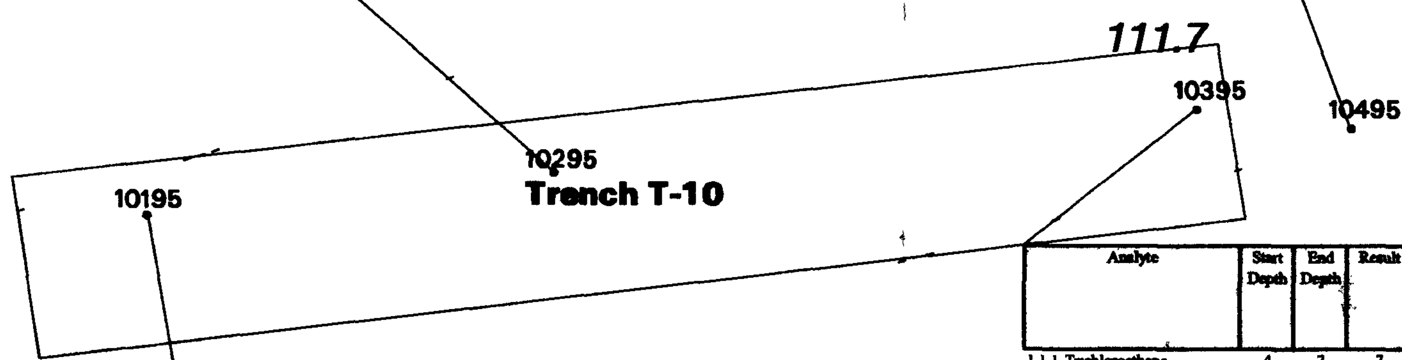
Analyte	Start Depth	End Depth	Result	Result Um	Detection Lim	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
4-Chloro-3 Methlyphenol	17	8	170	ug/kg	660			
Acetone	3	5	19	ug/kg	100	102000000	211000	
Acetone	17	18	12	ug/kg	100	102000000	211000	
Acetone	18	20	8	g/kg	100	102000000	211000	
bis(2 Ethylhexyl)phthalate	17	18	36	ug/kg	330	1970000		
Butylbenzylphthalate	17	18	47	ug/kg	330	147000000		
Butylbenzylphthalate	8	10	1300	ug/kg	330	147000000		
Butylbenzylphthalate	3	5	3000	ug/kg	330	147000000		
Diethylphthalate	3	5	56	ug/kg	330	590000000		
Di n-butylphthalate	8	10	83	ug/kg	330	73700000		
Methylene hloride	3	5	4	ug/kg	5	2530000	39500	
Methylene chloride	18	20	2	ug/kg	5	2530000	39500	
Methylene chloride	17	18	2	ug/kg	5	2530000	39500	
Toluene	3	5	2	ug/kg	5	31300000	128000	
T chloroethene	3	5	11	ug/kg	5	19600	509000	
Arsenı	8	10	15 9	mg/kg	2	22 2	21 6	13 14
Plutonium-239/240	17	18	0 03888	pCi/g	0 0409	50	3800	0 02

Analyt	Start Depth	End Depth	Result	Result Unit	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
Acetone	3	5	22	g/kg	100	102000000	2 000	
Acetone	8	10	12	ug/kg	100	102000000	211000	
Benzoic Acid	8	10	88	ug/kg	1600	1000000000		
Benzoic A id	3	5	160	ug/kg	1600	000000000		
bis(2 Ethylhexyl)phthalat	3	5	35	ug/kg	330	1970000		
bis(2 Ethylhexyl)phthalat	8	10	55	ug/kg	330	1970000		
Butylbenzylphthalate	3	5	66	ug/kg	330	147000000		
Butylbenzylphthalate	8	10	63	ug/kg	330	147000000		
Di n-butylphthalat	3	5	45	ug/kg	330	73700000		
Di n-butylphthalat	8	10	41	ug/kg	330	73700000		
Phenol	8	10	1700	g/kg	330	613000000		
Phenol	3	5	750	ug/kg	330	613000000		
Tetrachloroethene	3	5	4	ug/kg	5	615000	37500	
Toluene	3	5	2	ug/kg	5	3 300000	128000	
Lead	3	5	28 2	mg/kg	0 6	1000	25 6	24 97
Plutonium-239/240	3	5	0 119	pCi/g	0 0025	50	3800	0 02



Analyte	Start Depth	End Depth	Result	Result Unit	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
1 1 1 Trichloroethane	4	7	7	ug/kg	5	79700000		
Acetone	7	9	48	ug/kg	100	102000000	211000	
Acetone	4	7	28	ug/kg	100	102000000	211000	
Benzo( )anthracene	7	9	1700	ug/kg	330	34900	800000	
Benzo( )anthracene	7	9	1800	ug/kg	330	34900	800000	
Benzo( )anthracene	4	7	1000	ug/kg	330	34900	800000	
Benzo( )pyrene	4	7	11000	ug/kg	330	3490	25700	
Benzo( )pyrene	7	9	6500	ug/kg	330	3490	25700	
Benzo( )pyrene	7	9	4900	ug/kg	330	3490	25700	
Benzo(b)fluoranthene	4	7	2800	ug/kg	330	34900	1010000	
Benzo(g,h,i)perylene	7	9	1400	ug/kg	330			
Benzo(g,h,i)perylene	7	9	1900	ug/kg	330			
Benzo(g,h,i)perylene	4	7	4600	ug/kg	330			
Carbon Tetrachloride	4	7	19	ug/kg	5	81500	83200	
Chloroform	4	7	5	ug/kg	5	19200	101000	
Chrysene	7	9	3400	ug/kg	330	3490000		
Chrysene	4	7	2300	ug/kg	330	3490000		
Chrysene	7	9	3200	ug/kg	330	3490000		
Fluoranthene	7	9	450	ug/kg	330	27200000		
Indeno(1,2,3-cd)pyrene	4	7	1100	ug/kg	330	34900		
Methylene chloride	7	9	7	ug/kg	5	2530000	39500	
n-Nitrosodiphenylamine	7	9	870	ug/kg	330	7810000		
Phenanthrene	7	9	700	ug/kg	330			
Phenanthrene, 2,3,5-trimethyl-	7	9	10000	ug/kg				
Phenol	7	9	1300	ug/kg	330	613000000		
Phenol	4	7	2000	ug/kg	330	613000000		
Pyrene	7	9	6500	ug/kg	330	22100000		
Pyrene	7	9	12000	ug/kg	330	22100000		
Pyrene	4	7	2800	ug/kg	330	22100000		
Tetrachloroethene	4	7	410	ug/kg	5	615000	37500	
Toluene	4	7	10	ug/kg	5	31300000	128000	
Trichloroethene	4	7	4	ug/kg	5	19600	509000	
Americium-241	4	7	0 02015	pCi/g	0 0173	76	1900	0.02
Plutonium-239/240	7	9	0.00608	pCi/g	0.00613	50	3800	0.02

Analyte	Start Depth	End Depth	Result	Result Unit	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
Acetone	5	7	16	ug/kg	100	102000000	211000	
Acetone	7	9	14	ug/kg	100	102000000	211000	
Benzoic Acid	5	7	300	ug/kg	1600	1000000000		
Benzoic Acid	7	9	260	ug/kg	1600	1000000000		
bis(2 Ethylhexyl)phthalate	5	7	120	ug/kg	330	1970000		
bis(2-Ethylhexyl)phthalate	7	9	48	ug/kg	330	1970000		
Butylbenzylphthalate	5	7	55	ug/kg	330	147000000		
Butylbenzylphthalate	7	9	62	ug/kg	330	147000000		
Di-n-butylphthalate	5	7	45	ug/kg	330	73700000		
Methylene chloride	7	9	5	ug/kg	5	2530000	39500	
Methylene chloride	5	7	4	ug/kg	5	2530000	39500	
Phenol	5	7	1000	ug/kg	330	613000000		
Phenol	7	9	1500	ug/kg	330	613000000		
Americium-241	5	7	7.67	pCi/g	0 0195	76	1900	0.02
Plutonium-239/240	5	7	34.79	pCi/g	0.029	50	3800	0.02
Uranium-238	5	7	2.668	pCi/g	0 0812	351	1600	1 49

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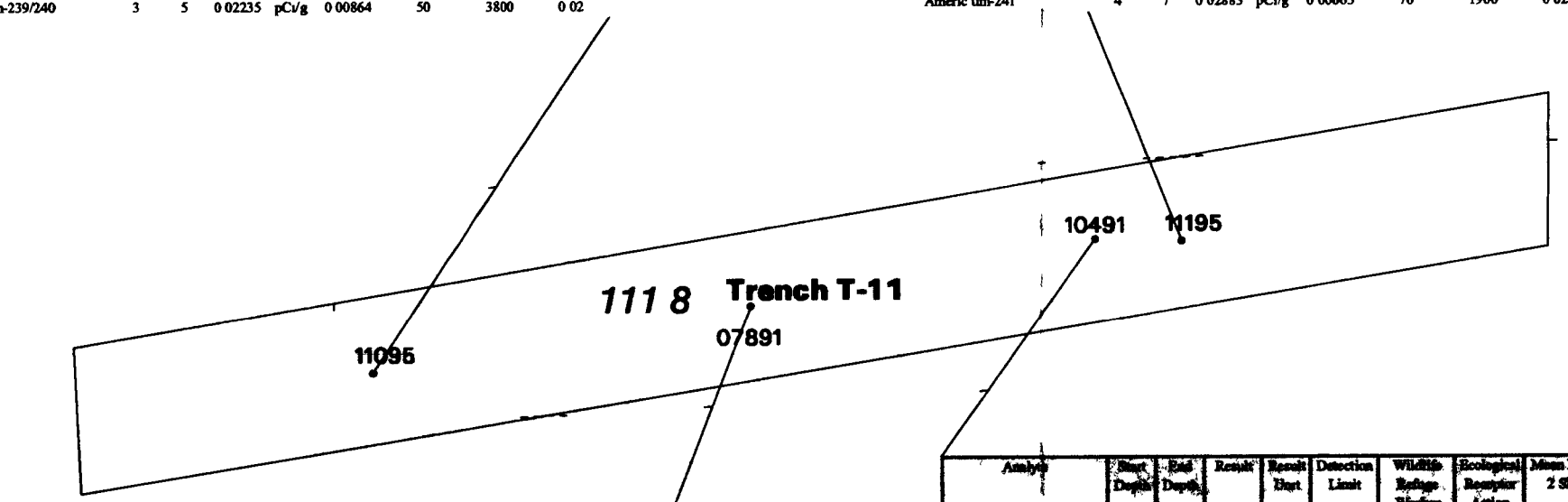
Analyte	Start Depth	End Depth	Result	Result Unit	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
1 Hexanol 2-ethyl	7	10	8	ug/kg				
Acetone	3	5	28	ug/kg	100	102000000	211000	
Acetone	7	0	9	ug/kg	100	102000000	211000	
Benzoic Acid	3	5	230	ug/kg	1600	1000000000		
bis(2 Ethylhexyl)phthalat	7	10	67	ug/kg	330	1970000		
bis(2 Ethylhexyl)phthalat	3	5	110	ug/kg	330	1970000		
Butylbenzylphthalat	7	10	130	ug/kg	330	1 7000000		
Butylbenzylphthalate	3	5	80	ug/kg	330	147000000		
Di-n-butylphthalat	7	0	56	ug/kg	330	73700000		
Methylene chloride	3	5	6	ug/kg	5	2530000	39500	
Phenol	7	10	550	ug/kg	330	613000000		
Phenol	3	5	440	ug/kg	330	613000000		
Nickel		10	163	mg/kg	8	20400		62 21
Plutonium-239/240	7	10	0 03716	pCi/g	0 00845	50	3800	0 02
Plutonium-239/240	3	5	0 02235	pCi/g	0 00864	50	3800	0 02

Analyte	Start Depth	End Depth	Result	Result Unit	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
4-Methyl-2 pentanone	4	7	2	ug/kg	50	16400000		
Acetone		7	17	ug/kg	100	102000000	211000	
Acetone		7	23	ug/kg	100	102000000	211000	
Benzoi Ac d	4	7	62	ug/kg	1600	1000000000		
bis(2 Ethylhexyl)phthal	4	7	71	ug/kg	330	1970000		
bis(2-Ethylhexyl)phthalate	4	7	81	g/kg	330	1970000		
Butylbenzylphthalate	4	7	59	g/kg	330	47000000		
Butylbenzylphthalate	4	7	140	g/kg	330	147000000		
Methylene chloride		7	2	g/kg	5	2530000	39500	
Phenol			270	ug/kg	330	613000000		
Nickel	4	7	105	mg/kg	8	20400		62 21
Plutonium-239/240	4	7	0 1676	pCi/g	0 0334	50	3800	0 02
Americium-241		7	0 04562	pCi/g	0 00589	76	1900	0 02
Plutonium 239/240	4	7	0 2632	pCi/g	0 0112	50	3800	0 02
Americ um-241	4	7	0 02883	pCi/g	0 00665	76	1900	0 02



Analyte	Start Depth	End Depth	Result	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
bis(2-Ethylhexyl)phthalate	16	22	47	330	1970000		
Toluene	2.8	3	2	5	31300000	128000	
Plutonium-239/240	16	22	0 0344	0	50	3800	0 02
Americium-241	2 1	8	0 04939	0	76	1900	0 02
Plutonium-239/240	2 1	8	0 2528	0	50	3800	0 02
Plutonium-239/240	8	14	0 03387	0	50	3800	0.02

Analyte	Start Depth	End Depth	Result	Result Unit	Detection Limit	Wildlife Refuge Worker Action Level	Ecological Receptor Action Level	Mean Plus 2 SD
1,2-Dichloroethene (total)	31 8	32	2	ug/kg	5	9200000		
Carbon Tetrachloride	31 8	32	3	ug/kg	5	81500	83200	
Chloroform	31 8	32	2	ug/kg	5	19200	101000	
Diethylphthalate	32	38	160	ug/kg	330	590000000		
Tetrachloroethene	31 8	32	4	ug/kg	5	615000	37500	
Tetrachloroethene	10 6	10 8	4	ug/kg	5	615000	37500	
Toluene	16.8	17	17	ug/kg	5	31300000	128000	
Toluene	19	19 2	20	ug/kg	5	31300000	128000	
Toluene	10 6	10 8	6	ug/kg	5	31300000	128000	
Toluene	43 8	44	610	ug/kg	5	31300000	128000	
Plutonium-239/240	14	20	0.03401	pCi/g	0 011	50	3800	0 02
Americium-241	2	8	0 02681	pCi/g	0	76	1900	0 02
Plutonium-239/240	2	8	0 03104	pCi/g	0 012	50	3800	0 02
Radium 228	8	14	2.044	pCi/g	0 5			2 04
Americium-241	8	14	0 02058	pCi/g	0	76	1900	0 02

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Figure 7
Trench T-11
Analyte Detections Above Background Levels

EXPLANATION

- Boreholes
- Trench Boundary
- IHSS Boundary

DATA SOURCE BASE FEATURES: Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSI, Las Vegas. Digitized from the orthophotographs. 1/95

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Scale 1 270
1 nch represents approxmat ly 23 feet

0 10 20Ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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M7 6 u /projects/fy2000/303-0478/dwg/t trench 11 ml

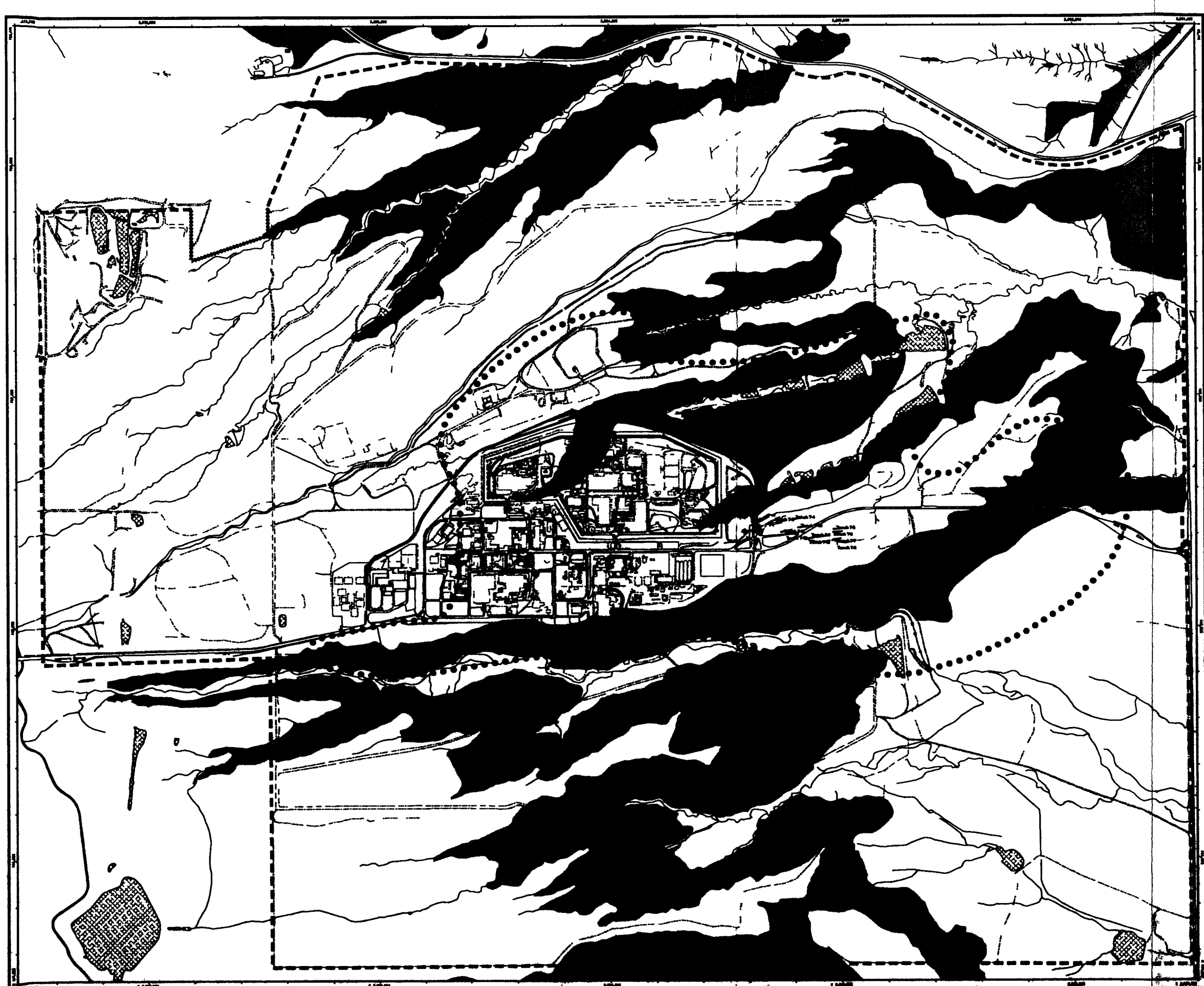

Figure 8

Area of Landslides and High Erosion Potential

EXPLANATION

- East Trenches
- Areas of landslides and high erosion Contaminated sites within these areas must be evaluated per Risk Screen 2 of Figure 3
- The anticipated boundary of areas that will be subject to institutional controls is subject to modification based upon characterization future response actions, the results of the comprehensive risk assessment, and the final remedial/corrective action decision in the final CAD/ROD. See Section 1 2
- Approximately 25 acres identified as proposed Wind Technology Expansion Area in Rocky Flats National Wildlife Refuge Act 2001

Standard Map Features

- Lakes and ponds
- Stream , ditches, or other drainage features
- Fences and other barriers
- Rocky Flats Environmental Technology Site boundary
- Paved roads
- Dirt roads

NOTES:

References:

1. Report on Soil Erosion and Surface Water Sediment Transport Modeling for the Actinide Migration Evaluation at the Rocky Flats Environmental Technology Site (August 2000)
2. Geologic Mapping: Shroba, R.R., and Carrara, P.E. Preliminary Surficial Geologic Map of the Rocky Flats Plant and Vicinity, Jefferson and Boulder Counties, Colorado: U.S. Geological Survey Open-File Report 84-162, Scale 1:9000
   Site source of topo base; see OFR 84-162 (on map)

North Walnut Creek

Pond B-5

Pond B-4

Pond B-8

Pond

Mound

Industrial Area Plumes

Central Avenue Drainage D

903 Pad
Ryan's Pit Plume

Interceptor Ditch

Pond C-1

Pond C-2

Figure 9
Composite VOC Plume and East Trenches Passive Reactive Barrier

EXPLANATION

East Trenches

Collection System

2nd Quarter 2001 Data
Water Level Contour
(20' Interval)

Dashed where Inferred

Current Composite Plume Key

Composite VOC Groundwater Plume (100 MCL)

Composite VOC Groundwater Plume (concentration equal to MCL)

Isolated occurrence of VOC exceeding Tier Action Levels (1998-2002 Data)

VOC Plume Extent (1998-2002 Data) (Dashed where Inferred)

Historic Composite Plume Key

1997 Composite VOC Groundwater Plume (100 X MCL)

1997 Composite VOC Groundwater Plume (concentration equal to MCL)

Standard Map Features

Buildings and other structures

Demolished buildings and Other Structures

Lakes and ponds

Streams, ditches, or ther drainage features

Fences and other barriers

Roads

Solar Evaporation Ponds (SEPs)

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